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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES
Paper No. 16

Serial Number: 09/087,141
Filing Date: 28 May 1998
Appellant(s): Fuchs et al

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28 [illegible]

Tony Piotrowski
For Appellant

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed 19 September 2000.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejection of claims 1-13, 15-19, 21-34, and 45 stand or fall together and claims 1-46 stand or fall together because appellant's brief includes a statement that this grouping of claims stand or fall together. See 37 CFR 1.192(c)(7).

(9) Prior Art of Record

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

5,812,261	Nelson et al	9-1998
5,734,470	Rogers et al	3-1998
5,546,881	Rogers et al	8-1996
5,394,413	Zayhowski	2-1995

Nelson et al, Optical Generation of Tunable Ultrasonic Waves, Journal of Applied Physics, Vol. 53, No. 2, February 1982, pp- 1144-1149.

(10) New Prior Art

No new prior art has been applied in this examiner's answer.

(11) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Rejections Under Double Patenting

Claims 1-13, 15-19, 21-34, and 45 stand rejected under the judicially created

doctrine of obviousness-type double patenting as being unpatentable over claims 1-8, and 25 of U.S. Patent No. 5,734,470 in view of Zayhowski(5,394,413).

09/087141	5,734,470
1. An apparatus for measuring a property of a structure, comprising:	1. A method of determining a property of a sample, said method comprising:
a microchip laser that generates an optical pulse; a diffractive element that receives the optical pulse and diffracts it to generate at least two excitation pulses;	(a) providing an excitation beam of radiation and then passing the beam through a pattern on a diffracting mask to form at least two excitation sub-beams;
an optical system that receives at least two optical pulses and spatially and temporally overlaps them on or in the structure to form an excitation pattern that launches an acoustic wave, electronic response, or thermal response that modulates at least a portion of the structure;	(b) overlapping at least two excitation sub-beams on a region of the sample with an imaging system to generate a spatially varying optical field which is an image of the pattern and which excites a transient grating in the region of the sample;
a light source that produces a probe beam that reflects off the portion of the structure to generate a signal beam;	(c) irradiating the transient grating with a probe beam of radiation oriented so that at least a portion of the probe beam is diffracted by the transient grating;
an optical detection system that receives the signal beam and in response generates a light-induced electrical signal; and	(d) detecting the diffracted portion of the probe beam with an optical detector to generate a light-induced signal; and
an analyzer that analyzes the light-induced electrical signal to measure the property of the structure.	(e) analyzing said light-induced signal from the optical detector to determine the property of the sample.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the limitations in Rogers(470) have a scope which includes all the limitations in the above rejected claims of the instant application except for the microchip laser which is taught by Zayhowski, note that at column 12 lines 26+ Rogers(470) discloses that a Q-switched laser is a known source for the optical modulating system. Replacing the Q-switched laser of Rogers(470) with the microlaser of Zayhowski would have been obvious in view of the size differences in a full sized Q-switched laser having a switching electronics and a microlaser. Note

that the above claims of Rogers(470) are not limited to nonlinear excitation and probe beams which is cited in Rogers claim 9.

Applicant argues that Rogers(470) indicate that the probe beam is diffracted by the transient grating while the claims of the application are limited to a reflected probe beam. When the probe beam is diffracted from the transient grating various diffraction orders are formed: 0th order, ±1st orders, ±2nd orders, ±3rd orders, etc. By definition the 0th order of diffraction is the specular **reflection** of the probe beam. At page 6 of the Brief applicant point out that the 0th order is spatially filtered, however this is the diffraction of the excitation beam which forms the transient grating and not the probe beam. See figure 3 where the excitation beam is diffracted from a grating(45) and the 0th order of the excitation beam is spatially filtered by the element(48).

Applicant also points out the benefits of using a microchip laser on page 5 of the Brief, however the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Replacing the Q-switched laser with a microchip Q-switched laser would have been obvious because of the reduction in size, power requirements, and increased durability and reliability, all the reasons why microchip technology has been adopted in the electronics arts.

Claims 1-13, 15-19, 21-34, and 45 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-22, and 19-33 of U.S. Patent No. 5,812,261 in view of Zayhowski(5,394,413).

09/087141	5,812,261
1. An apparatus for measuring a property of a structure, comprising:	16. A film-measuring instrument for determining the thickness of a thin layer which forms part of a sample, comprising:
a microchip laser that generates an optical pulse;	a first excitation laser source for generating a pulse of excitation radiation;
a diffractive element that receives the optical pulse and diffracts it to generate at least two excitation pulses; an optical system that receives at least two optical pulses and spatially and temporally overlaps them on or in the structure to form an excitation pattern that launches an acoustic wave, electronic response, or thermal response that modulates at least a portion of the structure;	an optical system oriented to receive the pulse of radiation from the excitation laser, separate the pulse into at least two optical pulses, and deliver the pulses to the sample so that they interfere within or on top of the sample to induce an acoustic waveguide mode which induces a ripple on a surface of the sample;
a light source that produces a probe beam that reflects off the portion of the structure to generate a signal beam;	a second, probe laser source for generating probe radiation oriented to irradiate and diffract off of the ripple induced on the surface of the sample to form a diffraction signal;
an optical detection system that receives the signal beam and in response generates a light-induced electrical signal; and	a detector for detecting the diffraction signal to generate a frequency or phase velocity of the acoustic waveguide mode; and
an analyzer that analyzes the light-induced electrical signal to measure the property of the structure.	an analyzer to determining a thickness of the layer from the frequency or phase velocity of the acoustic waveguide mode.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the limitations in Nelson have a scope which includes all the limitations in the above rejected claims of the instant application except for the microchip laser. Zayhowski teaches a passively Q-switched microlaser. Replacing the Q-switched laser of Nelson with the microlaser of Zayhowski would have been obvious in view of the size differences in a full sized Q-switched laser having a switching electronics and a microlaser. For example, Nelson claims "exciting time dependent acoustic waveguide modes in the sample by directing two time coincident laser pulses onto a sample" in claim 15, or the optical system of claim 16 neither of which claims diffracting the excitation beam as found

in the instant application's claims. However, diffracting the excitation beam is covered by the scope of the Nelson claims and is disclosed in Nelson as the way the excitation beam is divided into two pulses.

Applicant argues that Nelson(261) indicate that the probe beam is diffracted by the induced ripple while the claims of the application are limited to a reflected probe beam. When the probe beam is diffracted from the transient grating various diffraction orders are formed: 0th order, ±1st orders, ±2nd orders, ±3rd orders, etc. By definition the 0th order of diffraction is the specular **reflection** of the probe beam.

Applicant also points out the benefits of using a microchip laser on page 5 of the Brief, however the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Replacing the Q-switched laser with a microchip Q-switched laser would have been obvious because of the reduction in size, power requirements, and increased durability and reliability, all the reasons why microchip technology has been adopted in the electronics arts.

Rejections Under 35 U.S.C. § 103

Claims 1-34, and 45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rogers et al(5,546,881) in view of Zayhowski.

Rogers et al teach determining the mechanical properties of a film comprising a pulsed excitation light source, diffracting mask, focusing lens, pulsed probe source, focusing lens, and detector. The thickness of the film can also be

determined in the fitting algorithm, See column 12, lines 17-19. See column 13, lines 34+, column 15, lines 54+, and column 19, lines 36+ device limitations. Not taught is at least two photodiodes at the detector, an interferometer detector, a lens pair to focus the two excitation beams onto the sample, or a Q-switched microchip laser.

Zayhowski teaches a passively Q-switched microlaser, see figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Rogers device by providing a detector array in place of the single photodiode detector because an array would detect all the scattered probe beam. The use of an interferometer as the probe detector would also have been obvious since the use of an interferometer was well known to the skilled artisan at the time of invention. See page 21, lines 13+ of the instant application. The number of lenses used to focus the excitation pulses onto the sample would have been a mere choice of optical design thus the use of a lens pair over the lens taught would not provide a criticality over Rogers et al. Finally, replacing the Q-switched laser of Rogers with the microlaser of Zayhowski would have been obvious in view of the size differences in a full sized Q-switched laser having a switching electronics and a microlaser.

Claims 35-44, and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rogers et al(5,546,881) and Zayhowski as applied to claims 14, 20, and 22 above, and further in view of Nelson et al(Journal of Applied Physics 2/1982).

Rogers fails to teach a detector which detects part of the excitation beam.

Nelson et al(2/1982) teach the use of a detector to synchronize the two pockels cells. See figure 2.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Roger device with a detector of synchronize the excitation and probe pulses because if the probe pulse is not present during the time-dependent ripple formed by the crossed excitation beams then no measurement is possible.

Applicant also points out the benefits of using a microchip laser on page 5 of the Brief, however the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Replacing the Q-switched laser with a microchip Q-switched laser would have been obvious because of the reduction in size, power requirements, and increased durability and reliability, all the reasons why microchip technology has been adopted in the electronics arts.

(12) New Ground of Rejection

This examiner's answer does not contain any new ground of rejection.

(13) Response to argument

Applicant's argument that the probe beam is diffracted by the transient grating or ripple in the prior art while claims 1-34, 45 and 46 of the application are limited to a reflected probe beam are met by because the 0th order of diffraction is the specular **reflection** of the probe beam. As to claims 35-44, claim 35 still contains the limitation "reflects of diffracts".

Applicant also points out the benefits which can be the basis for patentability when the differences would otherwise be obvious. Replacing the Q-switched laser with a microchip Q-switched laser would have been obvious because of the reduction in size, power requirements, and increased durability and reliability, all the reasons why microchip technology has been adopted in the electronics arts.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Samuel A. Turner
Primary Examiner

SAT
26 October 2000

ROBERT H. KIM
PRIMARY EXAMINER

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